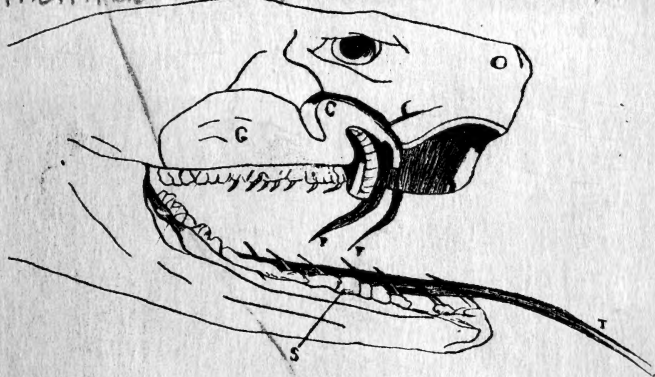


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**GUIDE  
THE EXHIBITION  
OF  
BIANS and REPTILES  
CINNATI SOCIETY  
OF  
NATURAL HISTORY**

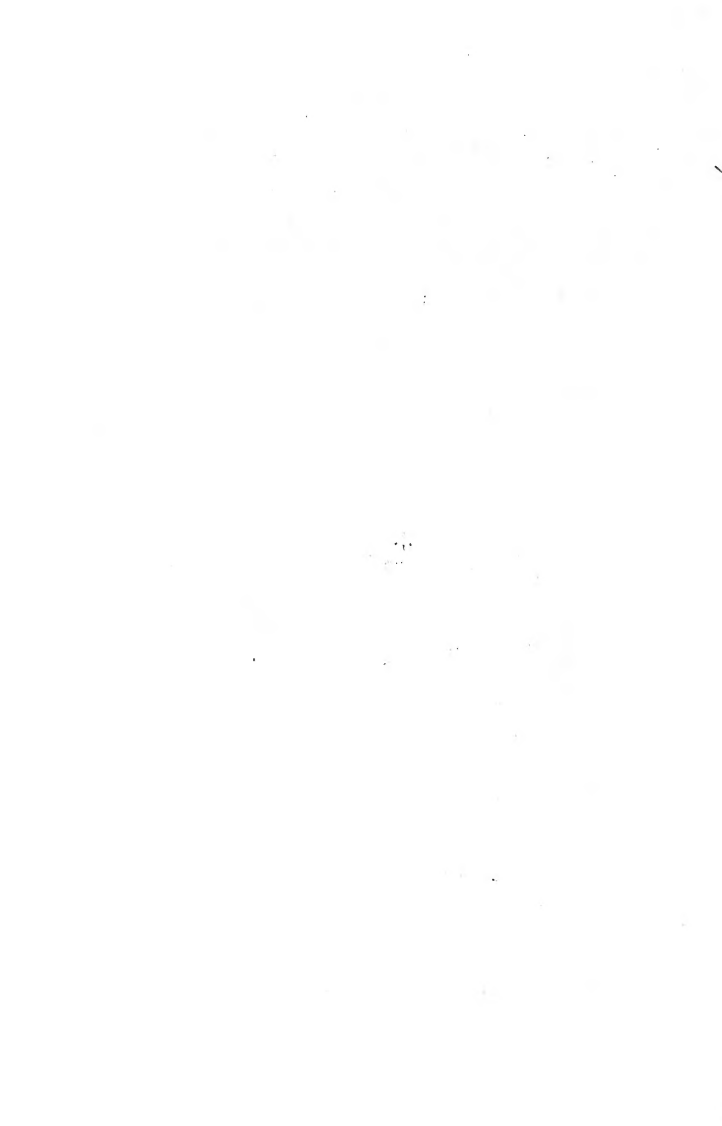
Cincinnati Society of Natural History



**Jaws of Rattlesnake**

**FF, Poison Fangs; G, Gland secreting poison;  
C, Canal leading from gland to base of fang;  
T, Tongue; S, Salivary glands.**

**Compiled By  
THE JUNIOR SOCIETY OF NATURAL SCIENCES**



## INTRODUCTION

Herpetology (from a Greek word meaning 'to creep') is a science which deals with two classes of cold-blooded vertebrates, the Amphibians and the Reptiles. The first class contains the frogs, toads, salamanders, and certain worm-like forms constituting a group called the Caecilians. The second, Reptiles, contains the turtles, snakes, lizards, crocodilians, and Rhynchocephalians. The key does not take the Caecilians into consideration.

### KEY to CLASSES and ORDERS

A. Skin without scales; young usually undergoing a metamorphosis.

Amphibia.

a. A tail present in adult stage.

Order *Caudata*- the Salamanders.

aa. Tail absent in adult; hind legs modified for jumping.

Order *Salientia*- the Frogs and Toads.

AA. Skin with scales; young similar to parents when born.

Reptilia.

a. Anal opening transverse.

b. Copulatory organs absent.

Order *Rhynchocephalia*.

bb. Copulatory organs present.

Order *Squamata*-Snakes and Lizards. (These may be told apart by the absence of external ear-opening and eyelids in the former and presence of them in latter).

aa. Anal opening longitudinal or round.

c. Body covered with a heavy bony shield or carapace; no teeth; jaws covered with horny shields.

Order *Testudinata* -- the Turtles.

cc. Body covered with horny, epidermic plates; jaws furnished with teeth; no bony carapace.

Order *Loricata* -- the Crocodilians.

The reptiles are very widely distributed, being found in all temperate and tropical portions of the world. The distribution of the Amphibians takes in about the same territory, but the salamanders reach their maximum development in temperate regions.

It is not within the province of this pamphlet to give a general account of the reptiles and amphibians. Such accounts may be had from the works cited in the bibliography appended.

### Herpetological Collections of the Cincinnati Society of Natural History.

The main collection of this department was made between the years 1870 and 1905. This collection was built up by Mr. Charles Dury and Professor Joshua Lindahl. Professor R. E. Call and Professor H. Garman also made valuable contributions. The greater part of this collection was destroyed through neglect, and most of the specimens of reptiles and amphibians now in the collection have been presented or collected by the Junior Society of Natural Sciences. The collection now contains 3100 spec-

imens, representing 142 species of North American reptiles and amphibians, besides many foreign species.

### Literature.

The library of the Cincinnati Society of Natural History contains as fine a collection of books on herpetology as exists anywhere in the middle west. In the "Journal of the Cincinnati Society of Natural History", the "American Journal of Arts and Sciences", the "Proceedings of the United States National Museum," the "Proceedings of the Junior Society of Natural Sciences", and elsewhere, will be found papers dealing with the C. S. N. H. collection of Herpetology.

### AMPHIBIA (Class). CAUDATA (Order).

The order Caudata comprises the salamanders, Amphibians which possess the tail throughout life and undergo a more or less complete metamorphosis. These animals are little known except to the special student, and the popular mind groups them all under the headings "Mud Puppy", "Water-dog", or "Spring Lizard". Nevertheless, in North America alone 85 forms occur. These are divided into three suborders. The first of these, the PROTEIDA, contains the well-known Mud-puppy of the eastern U. S. and also the blind *Proteus* of the caves at Carniola. The members of this suborder retain the gills throughout life. The suborder MUTABILIA, comprises all the true salamanders and contains 81 of the 85

forms inhabiting North America. The adults of this suborder lose the gills when attaining maturity. Two blind forms (*Typhlomolge* and *Typhlotriton*) of caves and artesian wells of the West, also belong to the Mutabilia. The last suborder of North American Caudata is MEANTES, comprising two forms, the peculiar *Siren* of the muddy ditches of the Southeastern U. S., and the equally interesting *Pseudobranchius striatus* of the swamps of South Carolina, Georgia, and Florida. This suborder differs in various points of anatomy from the two preceding.

PROTEIDA (Suborder).

NECTURIDAE (Family).

*Necturus* (Genus).

1. *Necturus maculosus* (Rafinesque). MUD-PUPPY.

The Mud-puppy is an entirely aquatic, nocturnal species. Its large size, coupled with the fact that it retains its gills throughout life, makes it unique among North American salamanders. It lays its eggs in "nests", which are usually shallow excavations beneath a sheltering stone or plank in the clear waters of the large streams which it inhabits. The female guards the young. This species sometimes attains a length of 17 inches.

MUTABILIA (Suborder).

AMPHIUMIDAE (Family).

*Amphiuma* (Genus).

2. *Amphiuma means* Garden. CONGO EEL.

Found from Virginia to Florida, west to Louisiana. Inhabits swampy situations. The eggs of this salamander are not laid singly, but are attached by jelly-like cords.

#### CRYPTOBRANCHIDAE (Family).

*Cryptobranchus* (Genus).

3. *Cryptobranchus alleganiensis* (Daudin).

#### HELLBENDER.

This form reaches a greater size than any other North American salamander; it has been known to attain a length of two feet. It is an exceedingly voracious animal.

#### SALAMANDRIDAE (Family).

*Triturus* (Genus).

4. *Triturus viridiscens viridiscens* (Rafinesque).

#### COMMON NEWT.

Appears in two forms; one, aquatic, is olive green with black specks and black-edged red spots; the other, terrestrial, is red, with the black-edged red spots, but with black specks absent from back.

5. *Triturus viridiscens dorsalis* (Harlan).

#### GARMAN'S NEWT.

Smaller and more slender than preceding, with a dorsolateral line of red (white in spirits): darker in color. Coastal region of North Carolina.

#### AMBYSTOMIDAE (Family).

*Ambystoma* (Genus).

6. *Ambystoma maculatum* (Shaw).

#### SPOTTED SALAMANDER.

A terrestrial species. Found from Nova

Scotia west to Wisconsin, southward to Georgia and Texas.

7. *Ambystoma texanum* (Matthes).

SMALL-MOUTHED SALAMANDER.

Similar to preceding in habitat. Found at Cincinnati.

8. *Ambystoma opacum* (Gravenhorst).

MARbled SALAMANDER.

Inhabits drier situations than most salamanders.

9. *Ambystoma talpoideum* (Holbrook).

TADPOLE SALAMANDER.

This form is an inhabitant of both moist and dry situations. Taken in company with *opacum* (Hendersonville N. C.).

PLETHODONTIDAE (Family).

*Desmognathus* (Genus).

10. *Desmognathus quadra-maculatus* (Holbrook).

BLACK TRITON.

This interesting form snaps fiercely when seized, but cannot pierce the skin with its exceedingly minute teeth. A very active, aquatic species.

*Desmognathus fuscus fuscus* (Rafinesque).

DUSKY SALAMANDER.

Perhaps the commonest species of the Plethodontidae; the food consists of insects, arachnids, earthworms, molluscs, and isopods.

12. *Desmognathus fuscus carolinensis* (Dunn).

CAROLINA TRITON.

A terrestrial species, inhabiting rotten logs.



Reaches an altitude of over 6000 ft. in Smokies.

13. *Desmognathus fuscus imitator* Dunn.

#### IMITATING TRITON.

Found in company with preceding in Smokies; has been taken in act of eating lepidopterous larva and a snail, (*Zonites sp.*). Received its name from its close resemblance in color to *Plethodon jordani* of the same region. Known from the Great Smoky Mountains.

*Plethodon* (Genus).

14. *Plethodon glutinosus* (Green).

#### SLIMY SALAMANDER.

An extremely common terrestrial species.

15. *Plethodon jordani* Blatchley.

#### RED-CHEEKED SALAMANDER.

Common in the forests of the Smokies, 4400-6000 ft. Food habits similar to those of *D. fuscus imitator*.

16. *Plethodon cinereus* (Green).

#### ASHY SALAMANDER; RED-BACKED SALAMANDER.

This species is said to progress by leaping when excited. If angered or frightened, it will cast its tail; a new caudal appendage soon appears.

17. *Plethodon metcalfi* Brimley.

#### UNSPOTTED SALAMANDER.

Inhabits the mountains of the Southeastern U. S., burrowing in the ground under logs, stones, etc.

*Pseudotriton* (Genus).

18. *Pseudotriton ruber ruber* (Sonnini).

RED SALAMANDER.

This species is usually found in springs. In addition to the usual insect and other invertebrate food, *ruber* has been found to eat other salamanders, and also frogs.

*Eurycea* (Genus).

19. *Eurycea bislineata bislineata* (Green).

TWO-LINED SALAMANDER.

A much more aquatic form than *longicauda* or *guttolineata*, or its near relative *wilderae*. The Two-lined salamander is also known to be somewhat cannibalistic in feeding habits.

20. *Eurycea bislineata wilderae* Dunn.

MOUNTAIN TWO-LINED SALAMANDER.

A terrestrial species; is taken in the Smokies in company with *Plethodon jordani*, *Desmognathus fuscus carolinensis*, *D. f. imitator*, etc. Also inhabits springs.

21. *Eurycea longicauda* (Green).

LONG-TAILED SALAMANDER.

An inhabitant of caves, but often found elsewhere in damp situations.

22. *Eurycea guttolineata* (Holbrook).

HOLBROOK'S TRITON.

Found in the Southeastern U. S. It is a terrestrial species, inhabiting rather dry situations. Is most active at night. Reaches an altitude of over 2000 feet in the mountains of North Carolina.

SALIENTIA (Order)

## INTRODUCTION TO SALIENTIA.

The Salientia, or leaping Amphibians, differ from the Caudata in the fact that the adults lack a tail. There are several suborders of this group recognized, but for practical purposes it may be divided into two groups (Superfamilies) each containing a number of smaller groups or families, each of which is descended from a common ancestor. The two major groups are:

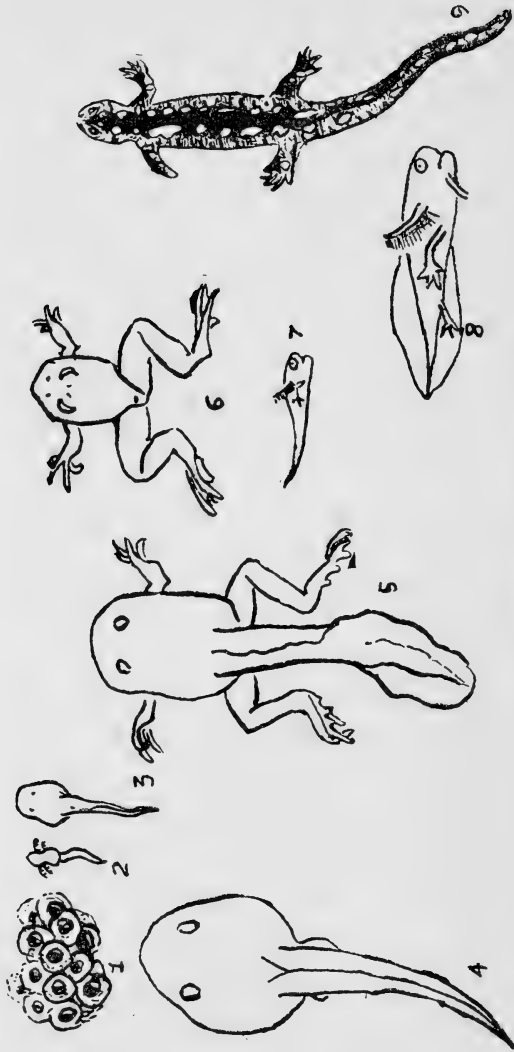
1. ARCIFERA. Two halves of shoulder girdle (coracoids and precoracoids) overlap in front so that the chest is capable of expansion.

This group contains the toads, some of the tree frogs, and other families. One family, the Discoglossidae (of which the only North American representative is *Ascaphus truei*), is considered to represent a separate suborder (Linguata), approaching the salamanders in the possession of ribs and other detailed characters of the skeleton.

2. FIRMISTERNIA. Two halves of shoulder girdle meet in front and unite (coracoids and epicorocoid cartilage), so that the chest is not capable of expansion.

Includes the frogs and the Engystomids in North America.

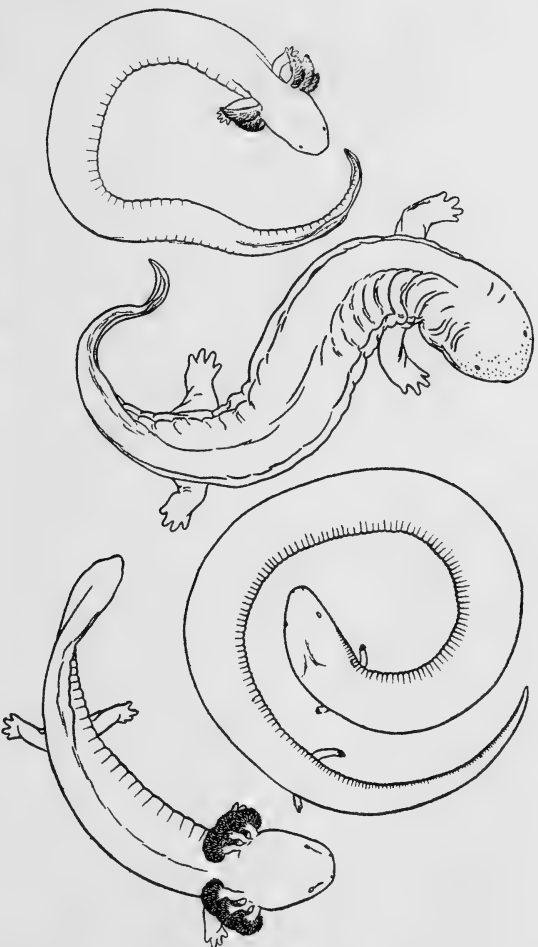
The skin of the various Salientia secretes poison, which is useful as a protection against enemies. The frogs and toads are extremely useful animals as they destroy an enormous amount of noxious insects. Salientia have a world wide distribution. There are many species, of which 75 inhabit



## DEVELOPMENT OF AMPHIBIANS

1-6 Stages in Development of Frog, *Rana* sp.

7-9 Stages in Development of Salamander, *Ambystoma maculatum*.



REMARKABLE SALAMANDERS OF THE SOUTHEASTERN  
UNITED STATES

1. Siren
2. Hellbender
3. Congo "eel"
4. Mud puppy

N. America. The development of Salientia is varied to a wonderful degree; many species undergo their metamorphosis in water after the manner of most of our North American species, but an equal number metamorphose in strange and varied manners; one South American species (*Pipa americana*) passes the larval or tadpole stage in small cavities in the back of the mother.

### LINGUATA (Suborder)

### SCAPHIOPODIDAE (Family)

#### 23 Scaphiopus (Genus)

#### 22 *Scaphiopus holbrookii holbrookii* (Harlan)

This curious and interesting species leads a burrowing life. Dickerson, in the "Frog Book", gives the following interesting account of this form: "A strange weird-looking creature is the Hermit Spadefoot when he is turned out of his ground burrow. At first sight he looks like a small brown ball of earth, but almost immediately air is expelled from the lungs, so that the inflated sides collapse, and two elevations rise at the smaller end and become two round staring eyes of so brilliant a gold that they seem out of place in such a dusky surrounding. Awkward hands are lifted one at a time and rubbed over the eyes. The Spadefoot, now quite awake and alert, begins trying to escape. He does not stealthily creep away as do many of the toads; he does not startle one with a prodigious leap, as do the frogs and treefrogs. He begins sinking out of sight into the soft earth, and in less time than it takes to tell it, has wholly dis-

appeared from view.

The Hermit Spadefoot is not well known. It burrows in the ground and sleeps days or weeks at a time. A gravedigger once found one 3 ft. 4 inches from the surface of the ground, with no evidence of entrance to or exit from the burrow. The Spadefoot is seldom found in gardens or orchards; but it is certainly true that if a Spadefoot Toad were turned out of its burrow by the plow, the casual observer would not give it a second glance, because it looks so much like an ordinary dingy brown toad, unless one sees its eyes”.

The Spadefoot, besides being solitary, is entirely nocturnal in habit.

In the breeding season, the Spadefoots are far from inconspicuous. They congregate by the hundreds in ponds in the spring for the purpose of depositing eggs, and during this time they make the night hideous with their raucous cries.

BUFONIDAE (Family)      *Bufo* (Genus)

24. *Bufo americanus* Holbrook.

### AMERICAN TOAD.

This is the common toad of the region east of the Rocky Mountains from Mexico to Great Bear Lake. It shares the Southern States with *Bufo terrestris*, and New York and New England with *Bufo fowleri*. This species sometimes feigns death when frightened.

25. *Bufo punctatus* Baird and Girard.

### SPOTTED TOAD.

This handsome species is a denizen of the

Western States - Texas, Arizona and Lower California. Its life history and habits are not well known, but it is said to live in burrows.

HYLIDAE (Family)      *Acris* (Genus)

26. *Acris gryllus* (LeConte). CRICKET-FROG.

This species is perhaps the most active of our small tree frogs. It inhabits the eastern U. S., living on the ground in damp situations.

*Hyla* (Genus).

27. *Hyla crucifer* Wied. SPRING-PEEPER.

This is the smallest representative of the genus in North America. It inhabits the Eastern United States and attains a maximum length of one and one-quarter inches.

28. *Hyla versicolor versicolor* (LeConte).

TREE TOAD.

This strictly arboreal variety is at once one of the most interesting and one of the commonest of the Amphibia Salientia inhabiting the eastern U. S. It ranges west to Kansas. The colour of *Hyla versicolor* varies greatly at different times and under different conditions, ranging from white to stone-gray or brown with many intermediate shades.

RANIDAE (Family)      *Rana* (Genus)

29. *Rana aesopus* (Cope). GOPHER FROG.

The Gopher Frog is known from Florida only. It is of very wary and secretive habits, and is rare in collections. Except in the breeding season, when it frequents ponds and swamps, it inhabits the burrows of the Gopher Tortoise (*Gopherus*



*polyphemus*), leading a solitary life. This frog is especially fond of toads as an article of diet. Owing to the extraordinary development of its jaws, it can accomodate toads of surprisingly large size.

30. *Rana catesbiana* Shaw. BULL-FROG.

These huge frogs are found throughout the United States east of the Rocky Mountains. They are usually less common than most other frogs, not only owing to their numerous natural enemies, but also to the fact that they are much desired as food by man. In the south they are secured by "gigging" or spearing. This is done at night; one of the hunters holds the frog immobile by shining a strong light, usually an electric torch, in its eye, while another member of the party impales the frog upon the "gig" or barbed spear.

The bullfrog remains in the larval stage for a year, and the tadpoles reach a very large size.

31. *Rana clamitans* Latreille. GREEN-FROG.

A handsome species, which shows a preference for springs and brooks. The cry of the Green Frog is peculiar and not unpleasing, and can be variegated from a scream suggesting a frightened bird to a low, musical "k-tun-n-ng", this last uttered when the frog jumps into water. Common throughout Eastern North America, including Canada and Florida.

32. *Rana pipiens* Schreber. LEOPARD FROG.

This is the most common frog of the United States east of the Sierra Nevada Mountains. It of-

ten wanders far from its aquatic home and is thus more often encountered than any other frog. The Leopard Frog is among the first of our frogs to leave its hibernating quarters in the spring, congregating in the shallow waters of marsh, pond, lake and even temporary pools, in early March, for the purpose of depositing its eggs.

33. *Rana sylvatica* LeConte. WOOD FROG.

Few frogs, either in North America or elsewhere, can vie with this species in beauty. Essentially a terrestrial form, the Wood Frog is found in aquatic situations only during its breeding season. At other times, it may be found wandering about the damp woods which form its home, or in some sheltered crevice in rock or decayed log. It is the first of our frogs to appear from its hibernating quarters in the spring, emerging from its burrow in leaves and moss in February or early March.

REPTILIA (Class)      DIAPSIDA (Subclass)  
LORICATA (Order)

The Crocodilians are carnivorous, fresh-water reptiles of large size. They are found only in tropical or semi-tropical regions. Their body is covered with epidermic plates; underneath some of these are bony dermic scutes. Modern zoologists divide the Loricata into three genera, *Crocodylus*, *Alligator*, and *Gavialis*. The first two of these have representatives in American waters, (*Crocodylus acutus* and *Alligator mississippiensis*); the last is found in India, Borneo and N. Australia.

The key will serve to separate these genera.

## KEY.

- A. Nasal bones form part of nasal aperture.
  - a. Head is short and broad. Union of two rami of lower jaw does not extend beyond fifth tooth.

### *Alligator.*

- aa. Head longer and narrower. Union of rami of lower jaw does not extend beyond the eighth tooth.

### *Crocodilus.*

- AA. Nasal bones do not form part of nasal aperture.

### *Gavialis.*

The members of the Loricata are very beneficial as scavengers; whether they cause any destruction of human life is a question open to dispute. Certainly the damage they may do in this way is negligible.

## CROCODYLIDAE (Family).

### *Alligator* (Genus).

- 34. *Alligator mississippiensis* (Daudin).

### AMERICAN ALLIGATOR.

Most people are more or less familiar with this reptile, which inhabits the swamps of the Southern United States, as far west as Texas, and as far north as North Carolina. The largest specimen known to Cope had a length of 14 feet. According to the best authorities, this species will not attack man. The hide of the American Alligator is valuable commercially, and the species is fast becoming extinct, owing to the merciless and

senseless slaughter by "sportsmen" and professional hunters. The Alligator is oviparous (for egg, see exhibit).

## RHYNCHOCEPHALIA (Order)

### HATTERIIDAE (Family)

The only living representative of this order of generalized reptiles is the Tuatera of New Zealand. This form is closer to certain fossil types (*Palaeohatteria*, Permian; *Hyperodapedon*, Triassic) than to any existing reptile.

### *Sphenodon* (Genus)

#### 35. *Sphenodon punctatus* Gray. TUATERA.

The few remaining individuals of this strange reptile are confined to a few small islands off the east coast of the North Island of New Zealand. Owing to the persecution of man and to the number of their natural enemies, the Tuateras will soon belong to the rapidly increasing list of animals which have inhabited this earth during our own era but which no longer exist. While it remains, the Tuatera is probably the most extraordinary animal on the face of the earth. Lizard-like in form, it is the closest to the birds of existing reptiles. Its nearest relatives are species of the Permian and Triassic ages, and it itself might well be called a living fossil. Perhaps even more interesting to anatomists than the generalized structure of *Sphenodon* is the light which it throws on the former use of the pineal gland. Dissection of *Sphenodon* has shown that this structure is the vestige of a third eye. The pineal eye of the Tuatera is visible in

young specimens as a light spot in the skin of the forehead; this is usually overlaid by pigment in the adult, but can sometimes be seen even in old specimens.

The Tuatera lives in burrows, often in company with the Puffin (*Fratercula*). It is held in superstitious awe by the natives but is nevertheless killed by them for food.

The skeleton on exhibition is that of a young adult.

### SQUAMATA (Order).

The order Squamata contains most of the existing species of Reptiles. It is divided into two suborders, the SAURIA (Lizards) and the SERPENTES (Snakes). Lizards and snakes are most abundant and reach their greatest size in the tropical regions of the earth, but are very widely distributed; the snakes are absent from many islands. Most lizards are terrestrial, but some are arboreal or semi-aquatic, and there is a single marine form. The only lizards which have been proved poisonous are the two species of the mono-generic family Helodermatidae of the Southeastern U. S. and Mexico (*Heloderma horridum* and *H. suspectum*). Lizards generally possess limbs, but there are numerous gradations in the number and size of digits and some forms are limbless (*Anguis*, *Ophisaurus*) and some even worm-like (*Rhineura* of Florida).

The snakes, while seemingly degenerate forms, are actually much more specialized than the

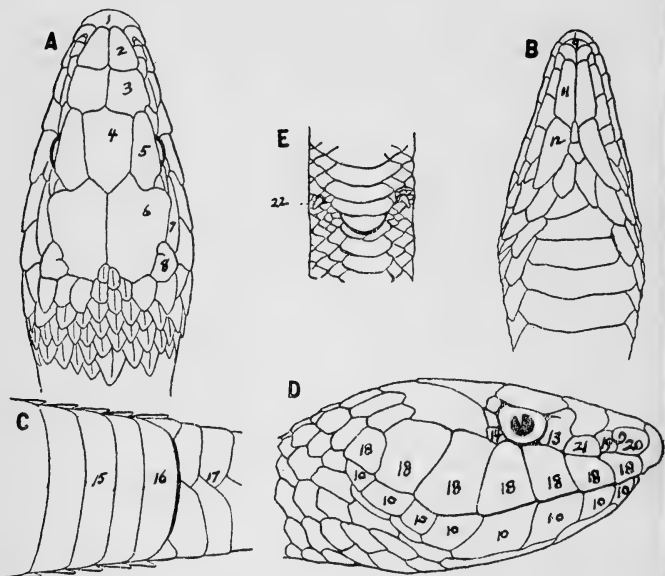
Lizards from which they have arisen, The muscular and nervous systems are very highly organized, and there are numerous remarkably peculiarities in the skeleton. The snakes progress by motion of the anterior ventral scales, which are fixed against the irregularities of the surface upon which the reptiles moves; the ribs are drawn first from one side, then to another; the hind portion shoots forward, and the process is repeated. Considering the method of progress, the celerity and grace of locomotion shown by snakes is extraordinary. There are quite a few species of poisonous snakes—some are arboreal, but the deadliest are aquatic or terrestrial. However the good done by the thousands of harmless species in the destruction of insect and rodent pests far outweighs the trifling damage done by the poisonous forms. Numerous superstitions concerning snakes, such as "Snakes do not die till sundown" and the fabled power of a snake to charm or hypnotize birds or other animals, have arisen. Needless to say, these are false, though some are based on misinterpretations of observed facts.

Most members of the order Squamata are beneficial to man, and their needless slaughter is to be heartily condemned; they should be rigorously protected.

The majority of Snakes and Lizards are oviparous (see Guide Book Number 68 of exhibit for a typical snake egg). Some are ovoviviparous; the Natricine (*Natrix*, *Thamnophis*) and Crotaline



TUATERA · 35. *Sphenodon punctatus* Gray.



Scalation of snake. A, Dorsal view of head, *Thamnophis* sp.; B, ventral view of head, *Pituophis* sp.; C, junction of body and tail; D, lateral view of head, *Thamnophis ordinoides vagrans*; E, Junction of body and tail; *Charina bottae utahensis*. 1, rostral; 2, internasal; 3, prefrontal; 4, frontal; 5, supra-ocular; 6, parietal; 7 and 8, first and second temporals; 9, symphyseal; 10, infra-labials; 11 and 12; anterior and posterior genials; 13, preocular; 14, postocular; 15, gastrostegite; 16, anal plate; 17, urostegite; 18, supralabials; 19, and 20, nasals; 21, loreal; 22, vestigial limbs.



(*Agkistrodon*, *Crotalus*, *Sistrurus*), snakes of this country belong to that group.

SAURIA (Suborder)      Iguanidae (Family)

*Anolis* (Genus)

36. *Anolis carolinensis* Voigt.

AMERICAN "CHAMELEON".

This form, common in the Southeastern U. S., is totally unrelated to the true Chameleons of the Old World, and should be called the "Anolis". The color changes for which it is so widely known are not governed by the material upon which it is placed, but by temperature, humidity, and the mood of the animal.

*Ctenosaura* (Genus).

37. *Ctenosaura hemilopha* Cope.

SAN LUCAN SPINY-TAILED IGUANA.

This large lizard is very common in parts of the southern portion of the Lower California Peninsula, where it is found among rocks or in trees. It eats vegetable food by preference, but is said to eat crabs when other food is scarce. Its flesh is eaten by the natives, and its spiny tail is used by it as a means of defence.

*Crotaphytus* (Genus)

38. *Crotaphytus collaris* (Say).

COLLARED LIZARD.

A handsome species, found from Arkansas south to middle Texas and west to Eastern New Mexico. Usually found in high altitudes, and is a very agile and graceful form. Entirely insectivorous.

*Sceloporus* (Genus)

39. *Sceloporus undulatus* (Latreille).

PINE SWIFT; FENCE LIZARD.

Common in the Southeastern U. S. Occurs sparingly in Ohio and has recently been seen at Cincinnati. Is largely arboreal in its habits, and insectivorous in diet. The males are brownish, with a black-edged blue patch on throat and abdomen; the females are grayish, barred with black, with no dark markings on abdomen.

*Phrynosoma* (Genus)

40. *Phrynosoma cornutum* (Harlan).

HORNED LIZARD.

This is the "Horned Toad" of the pet stores. With other members of this western genus, it has the habit of occasionally squirting blood from the corner of the eye. It will not drink water from a dish or other receptacle, but absorbs it when sprinkled on its skin.

*Ophisaurus* (Genus)

41. *Ophisaurus ventralis* (Linne).

GLASS SNAKE.

This lizard inhabits the Southeastern U. S. and extends north to Michigan. The body is elongated and serpentine, with no traces of limbs. The tail, which forms about two-thirds of the total length, can be discarded at will, but this habit is shared by many other lizards, and this species is unusual only in being destitute of the limbs which are usually present in lizards.

HELODERMATIDAE (Family)

*Heloderma* (Genus)

42. *Heloderma suspectum* Cope.

GILA MONSTER.

This, with its Mexican relative, *H. horridum* Weig., is the only known poisonous lizard in the world. The teeth of the lower jaw are grooved, and each is connected with an efferent duct communicating with a poison gland. The virulence of the poison is not as great as that of the poisonous snakes, but the animal can inflict a dangerous wound. In captivity, the Gila Monster is gentle and sluggish, and may be freely and unceremoniously handled. Very little is known of its food or habits in Nature, but its method of eating in captivity, which we have recently had the opportunity of observing, is very interesting.

An egg is placed in a flat dish in the lizard's cage. The *Heloderma* immediately approaches this receptacle and begins to lap up the egg with its fleshy tongue. It continues doing this very quietly for about ten minutes. Then it lifts its head into the air until its snout is almost perpendicular to the body, and permits the egg to run down its throat. The process is repeated until the dish is empty. The Gila Monster thrived for some time on this diet, but refused food when the cool weather set in. A short time before it died it was heard to give vent to a short cough on several occasions. The cast exhibited was prepared by Charles Dury, noted entomologist and taxidermist.

TEIIDAE (Family)

*Cnemidophorus* (Genus)

43. *Cnemidophorus sexlineatus* (Linne).

SIX-LINED RACE-RUNNER.

This Race Runner ranges from Florida to Maryland, west to Mexico, and north to Michigan.

SCINCIDAE (Family) *Eumeces* (Genus)

44. *Eumeces fasciatus* (Linne).

BLUE-TAILED LIZARD. SKINK. SCORPION.

This, one of our most interesting eastern lizards, was formerly abundant at Cincinnati; specimens are still taken here. *Eumeces fasciatus* varies so much in color, scutellation, and proportions with age and sex, that it has been given over a dozen scientific names. The female incubates the eggs, lying curled laterally around them in a hollow in a rotten log. The eggs are usually ten in number, and the young, when born, have tails of brilliant blue. This color is retained for several years. Specimens are often found with forked or double tail, due to the lizard's power to cast off and regenerate this organ at will.

LEPOSTERNIDAE (Family)

*Rhineura* (Genus)

45. *Rhineura floridana* (Baird)

FLORIDA WORM LIZARD.

This peculiar species, superficially resembling an earthworm, is confined to peninsular Florida. In life, the color is a lustrous pink. The worm lizard leads a subterranean life: very little is known of its habits.

SERPENTES (Suborder)

COLUBRIDAE (Family)      *Carphophis* (Genus)

46. *Carphophis amoena amoena* (Say).

WORM SNAKE.

This diminutive, worm-like snake is common in timbered regions of the United States, from Connecticut to Florida and west to Ohio, Illinois and Indiana. It inhabits the mouldy deposits of leaves and other decaying vegetation that cover the floor of the great deciduous forests of this region. It may also be unearthed by the plow, and is often found under the loose bark of decaying logs. Owing to its secretive habits, it is seldom seen, even in regions where it is abundant.

*Farancia* (Genus)

47. *Farancia abacura* (Holbrook).

HORN SNAKE; MUD SNAKE.

Though attaining a length of six feet, this handsome form is distinctly degenerate and is adapted for the subterranean life which it leads. It is found in the swampy regions of the southeastern U. S., hiding under fallen timber or burrowing in the earth.

*Diadophis* (Genus)

48. *Diadophis punctatus punctatus* (Linne).

RING-NECKED SNAKE.

This species, while small and secretive, is cannibalistic. It also eats salamanders, small lizards and insects. Found in the Eastern U. S., in the southern lowlands from Florida to North Carolina.

*Heterodon* (Genus)

49. *Heterodon contortrix* (Linne).

## HOG-NOSED SNAKE; SPREADING ADDER.

*Heterodon contortrix* is one of the most interesting North American members of the Serpentes. It receives one of its common names from its recurved rostral plate. The others have arisen from its peculiar method of defense. When frightened, the Hognosed snake, if unable to escape from the object of its fright, attempts to intimidate its enemy. Taking a deep breath, which causes its short, stout body to greatly increase in size, it spreads the anterior ribs laterally, thus flattening the head and neck until the width of the latter is trebled. The snake now presents a picture of ferocity equal to that presented by the deadly Cobra; an angry rattlesnake would appear quite harmless as compared to it if seen by an observer unacquainted with Herpetology. It then expells its breath with a loud and prolonged hiss, and may follow this by striking repeatedly at the object which has excited it. Yet all this demonstration is a pure bluff. The Hognosed snake is a mild and inoffensive reptile and refuses to bite when given the opportunity. If the observer is not intimidated by its ferocious actions, the animal brings further defensive resources into play. It suddenly throws itself into contortions; these gradually become quieter, diminishing to a spasmodic wriggling of the the tail and finally ceasing entirely. The snake turns on its back, lies limp, and is, to all appearances, dead. It is very persistent in feigning death; even if handled, it remains limp and relaxed; yet it will always betrays

itself under one condition. If placed with its ventral surface next to the ground, it will instantly turn over on its back. It seems to think that the only possible position for a respectable snake to assume in death is that of belly upwards.

*Heterodon contortrix* is commonly found in two phases; a normally colored form, and a melanistic phase, entirely black. This last has been given the scientific appellation of *niger*, but differs from the typical *contortrix* in no respect save color, and occupies the same range. It is strictly analogous to the melanistic form of *Plethodon cinereus*.

#### *Liopeltis* (Genus)

#### 50. *Liopeltis vernalis* (Harlan).

#### SMOOTH GREEN SNAKE.

This pretty species is almost entirely insectivorous and should be carefully protected. It is found in the Eastern United States, Canada south to Florida and west to Texas.

#### *Opheodrys* (Genus)

#### 51. *Opheodrys aestivus* (Linne).

#### ROUGH GREEN SNAKE.

The Rough Green Snake is arboreal in habits and is more southern in distribution than *L. vernalis*. Like that form, it is insectivorous. It has a curious habit, common among arboreal snakes of the Tropics, of protruding its tongue rigidly from its mouth, rather than vibrating it rapidly as do most snakes.

#### *Coluber* (Genus)

52. *Coluber constrictor constrictor* (Linne).

BLACK SNAKE.

Despite its latin specific name, the Black Snake is not a constrictor. It is, however, cannibalistic, and has been known to eat Crotalid snakes. In common with many other snakes, *Coluber constrictor* has the habit of rapidly vibrating the tip of the tail when disturbed. If it chances to be among dry leaves when this takes place, a rattling sound is produced which is strikingly similar to that made by the caudal appendage of *Crotalus*.

*Masticophis* (Genus)

53. *Masticophis flagellum flagellum* (Shaw).

WHIP-SNAKE.

Surprisingly little is known of the habits and life history of this common and widely - distributed form, which receives its name from the resemblance of the arrangement of its dorsal scales to a braided leather whip. It is known to be somewhat arboreal, and reaches a length of over eight feet. The food is composed of insects, small mammals, and other snakes. Needless to say, this species does not "whip" its enemies, as it is reputed to do in the Southern U. S.

*Elaphe* (Genus)

54. *Elaphe guttata* (Linne).

CORN SNAKE.

One of the most handsome of North American serpents, the Corn Snake is extremely beneficial to man, as are all members of *Elaphe*. It



receives its name from the fact that it frequents corn-fields and granaries, attracted to these places by the abundance of harmful rodents, which form its main article of diet.

55. *Elaphe obsoleta obsoleta* (Say).

#### PILOT BLACK-SNAKE.

An arboreal species, reaching a length of 8 ft. Is very gentle in its demeanor to man and makes an excellent pet. Constricts its prey, as do other members of *Elaphe*. Common in the Alleghany Mountains.

56. *Elaphe quadrivittata* (Holbrook).

#### CHICKEN SNAKE.

The popular name is a misnomer, as the species, while it may occasionally eat a young chicken, feeds largely on rodents.

*Pituophis* (Genus)

57. *Pituophis mugitus* (Barbour).

#### FLORIDA PINE SNAKE.

When annoyed, this Pine Snake, (as do other *Pituophis*) emits a loud and prolonged hiss. A powerful constrictor; is fond of eggs as an article of diet.

*Lampropeltis* (Genus)

58. *Lampropeltis elapsoides elapsoides* (Holbr.)

#### SCARLET KING SNAKE.

This burrowing species is named from its extraordinary resemblance to the poisonous Coral Snake (*Micrurus fulvius*), a species to which it is totally unrelated.

59. *Lampropeltis getulus getulus* (Linne).

## KING SNAKE.

The King Snake is cannibalistic, and is well known through its ability to kill and eat the various poisonous snakes. Is immune to the poison of Crotaline snakes, and kills its prey by crushing it in its powerful coils.

60. *Lampropeltis getulus floridana* (Blanchard).

### FLORIDA KING SNAKE.

The extreme southern representative of *getulus*. Reaches a greater size than the typical form.

61. *Lampropeltis getulus nigra* (Yarrow).

### BLACK KING SNAKE.

Replaces *getulus* in Ohio.

*Natrix* (Genus).

62. *Natrix kirtlandi* (Kennicott).

### KIRTLAND'S SNAKE.

A small species which has taken up a partly terrestrial life. Common at Cincinnati, where it is known as the "Red-Bellied Snake", a name applied to the species of *Storeria* in the East and to *Abas-tor* in the South.

63. *Natrix septemvittata* (Say).

### QUEEN SNAKE.

Frequents the banks of small brooks. A rather degenerate form.

64. *Natrix sipedon sipedon* (Linne).

### COMMON BANDED WATER SNAKE.

Greatly resembles the Cottonmouth Moccasin (*Agkistrodon piscivorus*), for which it is often mistaken. The points of difference between these

forms which are easily ascertainable are the facts that the poisonous species possesses a blind depression or pit between nostril and eye, and that the plates on the ventral surface of the moccasin's tail are single, while those of the Common Water Snake are in two rows. These features are well illustrated by the exhibit. *Natrix sipedon* is ovoviviparous.

65. *Natrix taxispilota* (Holbrook).

#### WATER-PILOT.

This striking form inhabits the swamps and rivers of the Southern U. S. and attains a greater size than any other member of the genus, occasionally reaching a length of six feet.

*Storeria* (Genus)

66. *Storeria occipito-maculata* (Storer).

#### RED-BELLIED SNAKE.

Found among rocks or flat stones, under which it hides during the day. Feeds on soft-bodied insect larvae and on snails.

*Thamnophis* (Genus).

67. *Thamnophis sirtalis sirtalis* (Linne).

#### COMMON GARTER SNAKE.

Perhaps the most abundant and most well known North American snake.

68. Eggs of Colubroid snake, found in a rotten log at Ferris' Woods, Cincinnati, Ohio.

*Tantilla* (Genus)

69. *Tantilla coronata* Baird & Girard.

#### CROWNED SNAKE.

Interesting as being our only Eastern Opisthoglyph snake. A diminutive, burrowing species,

having a pair of grooved fangs in the rear of the mouth. The specimen on exhibition is unusually large, measuring 255 mm. in length.

ELAPIDAE (Family)      *Micrurus* (Genus)

70. *Micrurus fulvius* (Linne).

### CORAL SNAKE.

The Coral Snake belongs to the same division of the poisonous snakes as the Cobra of India. It is perhaps the most beautifully colored of our North American Snakes. A burrowing form, it is seldom seen abroad, and consequently is not dangerous to man, although its bite is very dangerous and may be deadly. It possesses a pair of short, erect, grooved fangs in the anterior portion of the jaw, and bites with a chewing motion, making several fang punctures. Found from Ohio and Indiana south to Florida, west to Mexico and Central America.

CROTALIDAE (Family)      *Agkistrodon* (Genus)

71. *Agkistrodon mokasen* Beauvois.

### COPPERHEAD.

One of our smaller Pit-Vipers, the bite of which is seldom fatal. Possesses the typical poison apparatus of a Crotaline snake, consisting of a pair of elongated, hollow fangs, which fold back against the roof of the mouth when not in use, and a poison gland located in the head behind the eye. The snake strikes at its prey from an s-shaped coil; the fang actually stabs rather than bites. (For a detailed description of venom apparatus of Pit Vipers, see works in Bibliography.)

The Pit is a deep orifice located in the side of the face between nostril and eye; it is lined with a delicate membrane and is connected with the brain by a well-developed nerve. Its use is not known, but it serves as a convenient character for recognition of members of the family Crotalidae. The Copperhead occurs in Ohio, often being found in abandoned quarries.

72. *Agkistrodon piscivorus* (Lacepede).

#### COTTONMOUTH MOCCASIN.

Our only poisonous watersnake. Not found north of West Virginia. The young of this species resemble the preceding (see exhibit).

#### *Crotalus* (Genus)

73. *Crotalus adamanteus* Beauvois.

#### DIAMOND-BACK RATTLESNAKE.

Our largest and most dangerous snake. Specimens have been reported 13 feet in length but there is no evidence to show that the species ever exceeds eight and one-half feet.

74. *Crotalus atrox atrox* (Baird & Girard).

#### WESTERN DIAMOND-BACK.

Western representative of the preceding, but much smaller. Feeds on rodents and other warm blooded prey.

75. *Crotalus horridus* Linne.

#### TIMBER RATTLESNAKE.

This is the common Eastern member of the genus. Frequents timbered areas from Maine to Georgia, westward to the great plains. Appears in several color varieties; a black form is found in

the Alleghany mountains, where *horridus* is fairly abundant. The rattle, which this, in common with other members of the genera *Crotalus* and *Sistrurus*, possesses, is unique among snakes. It consists of a number of light, horny segments loosely attached to each other by a "ball and socket" arrangement. Its use is not known, but to state that it is used to warn the prey is absurd, as Nature would not be likely to provide the snake with an apparatus for driving away its means of subsistence. The age of a Rattlesnake cannot be told, contrary to the popular belief, by counting the segments of the rattle, as one of these is added every time the snake sheds its skin, which is a process of irregular occurrence. Furthermore, many segments are lost by accident, and rattles with more than 12 or 13 segments are rare, although ones of 100 or more segments may easily be manufactured from a number of appendages from different snakes.

#### SYNAPSIDA (Subclass) TESTUDINATA (Order)

The turtles form a very distinct group, easily recognizable by the bony shell or carapace which forms the covering of most of the species. The group is a small one as to number of species, containing about 200 forms. The shell of the Testudinata consists of two portions, joined by an osseous bridge or cartilaginous suture. The upper is more or less convex, and is called the carapace. The lower is smaller and flattened and is known as the plastron. In the majority of existing turtles the carapace is covered with horny or bony plates,

though in two groups its surface is leather-like (Dermochelidae and Trionychidae). Some of the marine turtles attain a weight of over a ton. The species which occur off our coast belong to the following genera: *Chelonia*, *Eretmochelys*, of the Cheloniidae, and *Dermochelys* of the Dermochelyidae.

Some fresh water turtles (*Chelydra* and *Macrochelys*) may attain a weight of over 50 lbs. but the majority are of moderate size, and many are small. Members of the genus *Testudo*, which contains the well-known Galapagos Island tortoises (14 species recognized), also reach a huge size. The shell of one of these gigantic turtles is in the possession of the Museum and may be seen by interested visitors. The osteology is well illustrated by the fine skeleton of the Green Turtle, *Chelonia mydas*, which is exhibited in the second floor hall.

#### KINOSTERNIDAE (Family)

##### *Sternotherus* (Genus)

##### 76. *Sternotherus carinatus* (Gray)

#### KEELED STINK-POT.

An aquatic, carnivorous species inhabiting the Western United States.

##### 77. *Sternotherus odoratus* (Latreille).

#### STINK-POT.

Similar in habits to preceding but found in the Eastern U. S. The plastron bones shown illustrate the general osteology of that structure.

#### CHELYDRIDAE (Family). *Macrochelys* (Genus)

##### 78. *Macrochelys temmincki* (Holbrook).

#### ALLIGATOR SNAPPER.

The largest of our fresh-water turtles; an exceedingly voracious species. Mississippi basin.

*Chelydra* (Genus)

79. *Chelydra serpentina* (Linne).

#### SNAPPING TURTLE.

This form has habits similar to those of the preceding. It often engages in overland pilgrimages and sometimes raids the barnyard. Smaller than *temmincki* but may weigh 25 pounds.

TESTUDINIDAE (Family) *Clemmys* (Genus)

80. *Clemmys guttata* (Schneider).

#### SPOTTED TURTLE.

An inhabitant of ponds and ditches of the Eastern U. S. Feeds on both vegetable and animal life.

*Emys* (Genus)

81. *Emys blandingii* (Holbrook).

#### BLANDING'S TURTLE.

This semi-aquatic form bridges the gap between the entirely aquatic species, which can only take their food when submerged, and the terrestrial forms which eat only on land. It can take food either way.

*Terrapene* (Genus)

82. *Terrapene carolina carolina* (Linne).

#### BOX TURTLE.

A terrestrial species which can entirely withdraw its head and limbs into its shell. This gives it complete protection against any natural enemy. Is herbivorous, and, like other terrestrial Testudinians, attains a great age.



*Chrysemys* (Genus)

83. *Chrysemys picta* (Schneider).

PAINTED TURTLE.

Aquatic; found in the Eastern U. S. from New Brunswick to Georgia. A handsome species. (Eggs of this form, laid in captivity, are on exhibition).

*Pseudemys* (Genus).

84. *Pseudemys floridana* (LeConte).

FLORIDA COOTER.

Frequents the waters of the Southern U. S. from Georgia to Florida. Members of this genus are commercially valuable as food, and are sold in the markets under the general name of "Sliders" or "Cooters".

85. *Pseudemys scripta* (Schoepff).

COOTER.

Similar in habits to *floridana* but found from Georgia to North Carolina. Both are omnivorous in diet.

*Gopherus* (Genus)

86. *Gopherus polyphemus* (Daudin).

A near ally of the true tortoises (*Testudo*). Inhabits dry areas in the Southeastern U. S., digging deep burrows in the earth from which it ventures abroad at night and in the early morning to browse upon the vegetation which forms its food.

CHELONIIDAE (Family) *Eretmochelys* (Genus)

87. *Eretmochelys imbricata* (Linne).

HAWKSBILL TURTLE.

It is from this handsome marine turtle that the tortoise-shell of commerce is obtained. The

species is rapidly nearing extinction, owing to the demand for the plates which cover the carapace. The specimen on exhibition has been polished; in nature, the plates are rather dull in color.

### Conclusions

For the use of the plate entitled "Remarkable Salamanders of the Southeastern U. S." we are much indebted to the authorities of the Field Museum of Natural History. It is reproduced from "Salamanders of the Chicago Area" by Mr. K. P. Schmidt (Field Museum Zoology Leaflet 12). The figures illustrating the scalation of snakes are reproduced from "Snakes of Utah" by Herbert Pack. The remaining illustrations are from drawings by Mr. Samuel Loring.

If the above account should interest anyone in the fertile field of herpetology, upon which it so briefly and inadequately touches, the time and labor expended in compiling it and in preparing the exhibition which it is intended to illustrate will be considered well spent.

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Respectfully submitted,

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